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20. Abstract

Upon cooling, solutions of rigid-rod macromolecules often form gels. These can be further processed to form microcellular materials with very regular structure. A two -stage melting of the precursor gels has been tentatively associated with a bimodal structure found in the microcellular materials.

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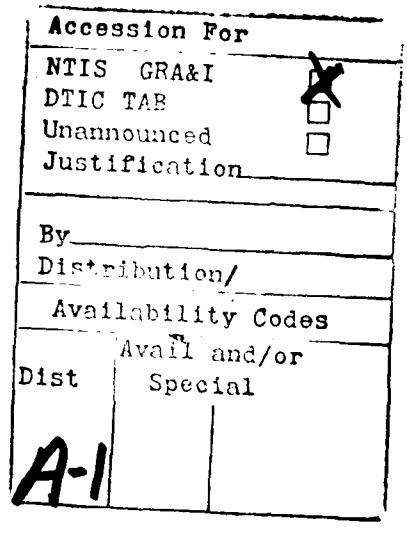

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STATEMENT OF PROBLEM STUDIED

In solutions of rigid-rod macromolecules, an antagonistic interaction between the solvent and rod causes the rods to aggregate. The aspect of interest to us in this research is the nature of the supermolecular structures which result on further processing of these solutions. A final step in the processing is the complete removal of the solvent to form a three-dimensional microcellular material. The specific problem addressed was the influence of the aggregating nature of the solvent (as determined by various physical-chemical methods) on the supermolecular structures and the resulting microcellular materials.

SUMMARY OF RESULTS

Using the model system polybenzylglutamate (PBLG), we studied a range of solvents including benzene, benzyl alcohol, dioxane and dioxane/water mixtures. The nature of the intermediate structures (gels) from these solutions was investigated by dynamic mechanical and thermal techniques. We found that the gels had a complex structure which melted in two stages. This characteristics was independent of the aggregating nature of the solvent (e.g., benzene vs benzyl alcohol). Detailed examination of the concomitant microcellular materials revealed, in some cases, a distinct structural bimodality which could be the cause of two-step melting of the gel.

LIST OF PUBLICATIONS

Publications partially supported by this grant include:

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